



## Value of Distributed Energy Resources in Distribution Infrastructure

### **Committee Workshop: California's Distribution Planning Process and the Role of Distributed Generation and Demand Response**



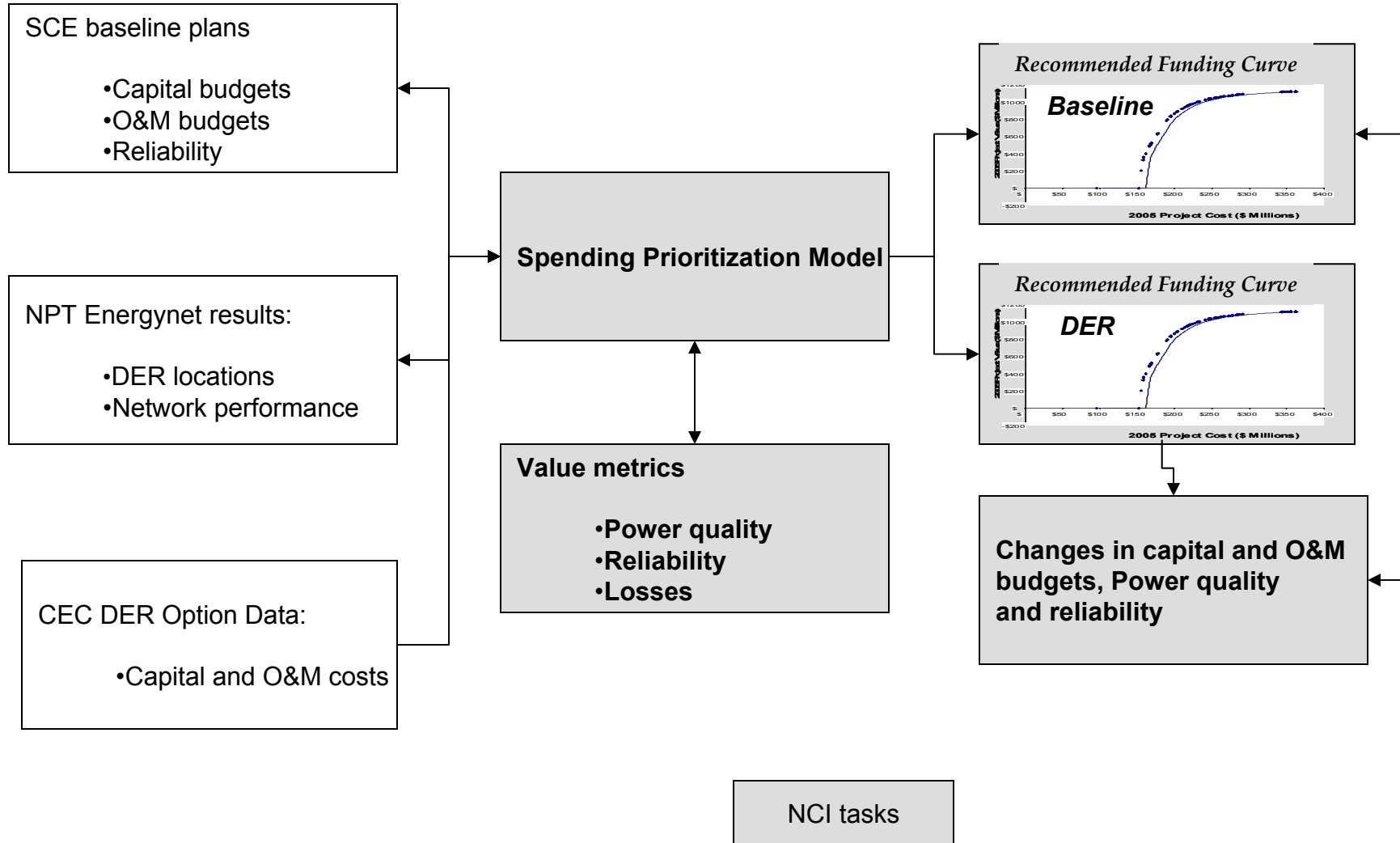
April 29, 2005

## Objectives – Value of Distributed Energy Resources (DER)

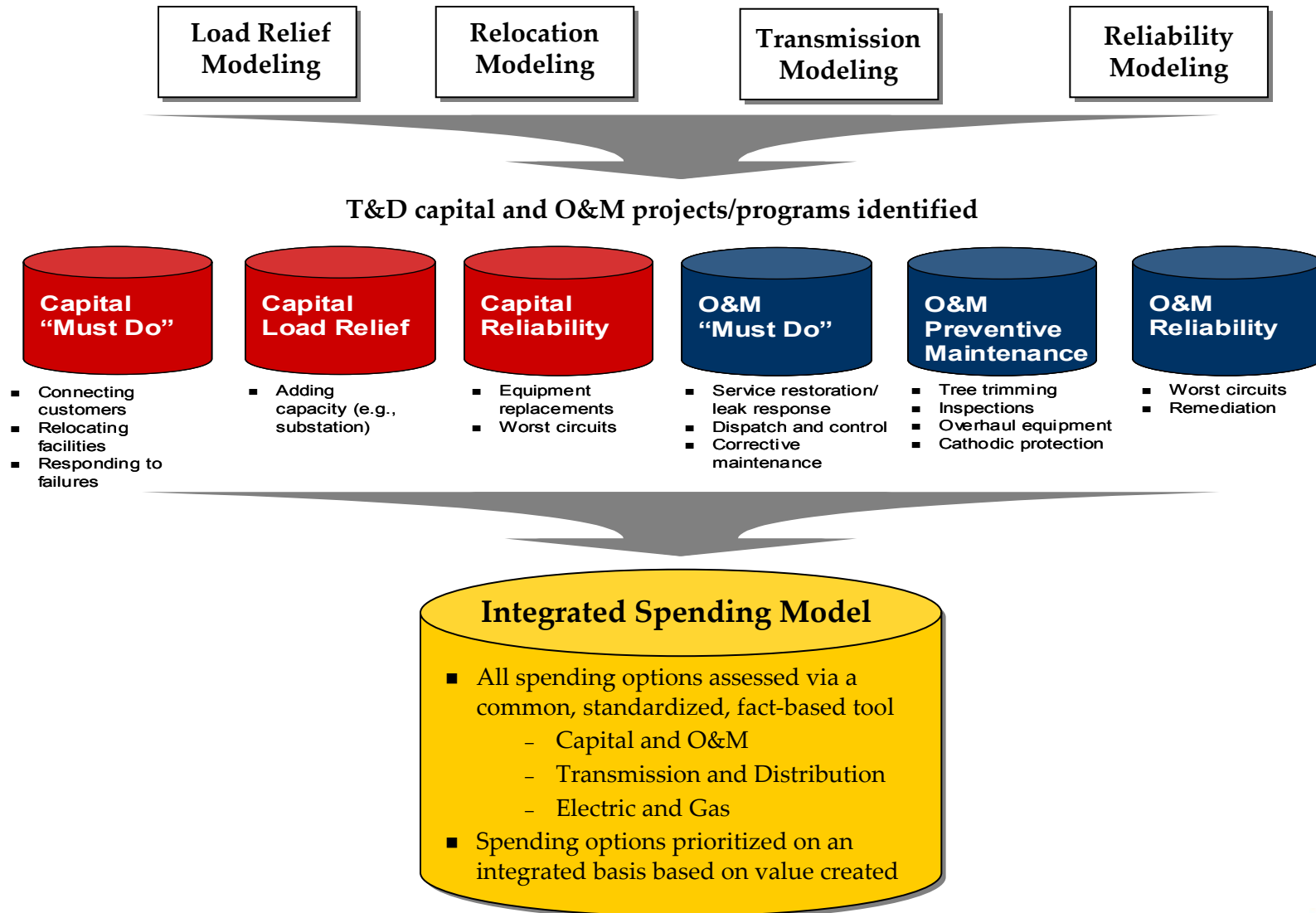
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- Evaluate DER value as distribution upgrade strategy
  - Use metrics used for other distribution upgrade investments
- Quantify benefits of strategically sited DER on “apples to apples” basis to other distribution system upgrade options
  - Power quality
  - Reliability
  - System losses
- Assess potential impacts on:
  - Capital and O&M budgets
  - Power quality and reliability
- Provide methodology that can be applied to other systems

# Project Overview



# The spending prioritization model provides an integrated approach to T&D spending....



... which helps companies to assess spending options across the entire T&D organization

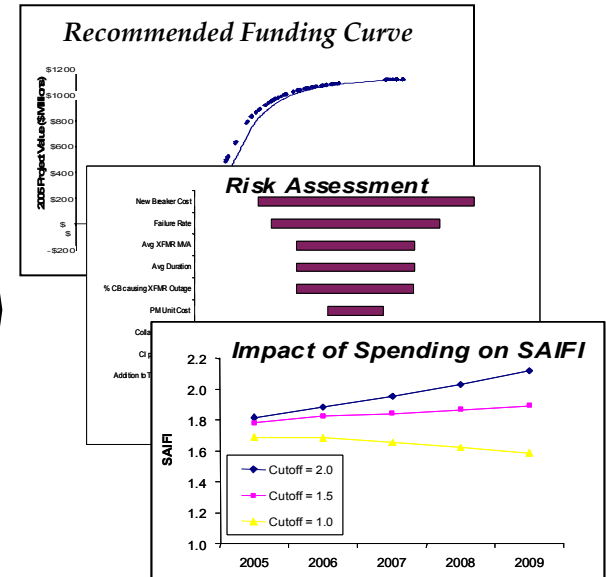
### Key Value Measures

Avoided costs of:

- Preventive maintenance
- Customer service interruptions
- Corrective maintenance, including collateral damage

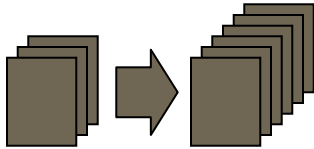
### Integrated Spending Model

- All spending options assessed via a common, standardized, fact-based tool
  - Capital and O&M
  - Transmission and Distribution
  - Electric and Gas
- Spending options prioritized on an integrated basis based on value created



*We will provide an overview of how the model works.*

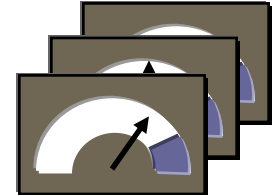
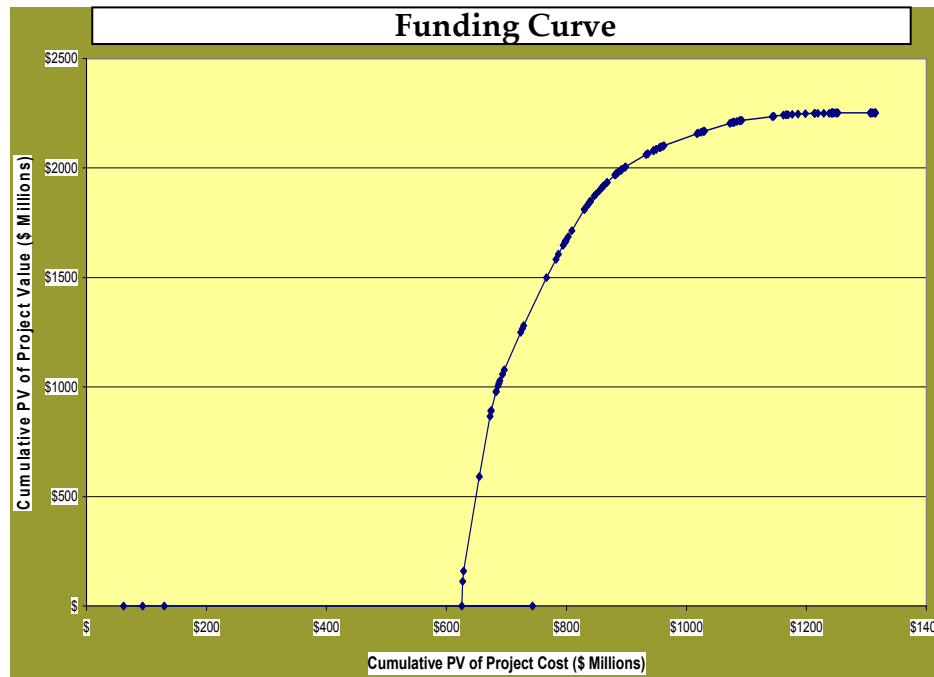
# The 'decision tool' ranks each major project/option by its 'bang per buck'



## Option Development

Developing cost-effective alternatives for possible funding

- Additions
- Upgrades
- Replacement
- Maintenance
- Standards
- Systems



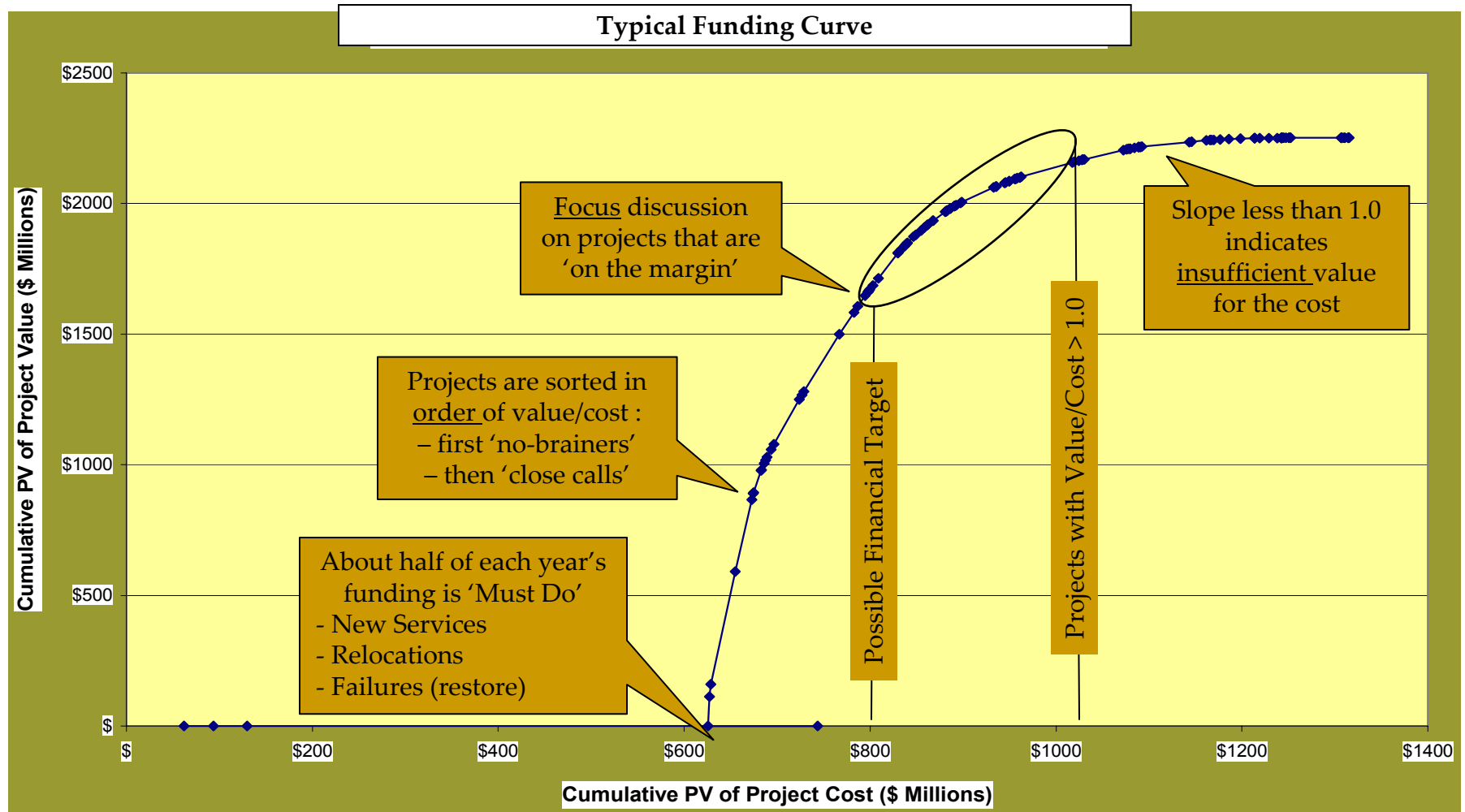
## Results Monitoring

Measuring & managing the drivers of the funded projects and processes

- Benchmarking
- Unit costs
- Failure rates
- Event impacts
- Value added



# The goal is a standard approach to valuation and prioritization within and across business units



## The model is based on a comprehensive set of general modeling parameters that impact project value and costs

| Key Categories   | Example Parameters  |
|--|---|
| <b>General</b>   | Inflation, annual hours per year  |
| <b>Financial</b>                                       | Discount rate, loaded labor costs per FTE, terminal value   |
| <b>Asset Population</b>                                | Customer count (residential, industrial, etc.), line miles, substations   |
| <b>Customer Satisfaction &amp; Reliability Indices</b> | SAIFI/CAIDI (non-storm), JD Powers weightings (company image, power quality and reliability, etc.)              |
| <b>Regulatory Response</b>                             | Mandated costs (O&M and capital programs), reactive response cost per customer interruption                     |
| <b>Failures</b>  | Substation transformer failure rates, new circuit breaker failure rates, failure rates per mile OH distribution |
| <b>State-specific Modeling</b>                         | Worst circuits, tree trimming, line inspection  |

*Additionally, there are unique parameters that are also used to analyze each different spending category (e.g., load relief, substation reliability).*



## Power system characteristics, such as the associated with outages are related to corporate value

### Potential Cost to the Company

\$1 Million per year

**Claims &  
payments**

\$5 Million per year

**Penalties, fines,  
(PBR-like)**

\$10 Million per year

**Outage restoration &  
collateral damage**

\$25 Million per year

**Major event audits,  
mandated programs,  
remediations, reporting**

\$25 Million per year

**Adjustments to rate base  
and allowed rate of return**

### Typical Cost per Event

\$50 - \$100 per claim made;  
higher for C&I than  
residential

\$10 - \$50 per customer out

\$500-\$100,000 per outage

\$10,000-\$100,000 per MWH  
\$50-\$200 per customer out








\$10,000-\$100,000 per MWH

## Work task summary

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1. Develop investment analysis roadmap
  - Integrate DER options into asset spending model frameowrk
  - Coordinate data exchanges with NPT
2. Develop performance metrics and criteria
  - Develop value metrics for power quality
3. Develop DER sub-models (DG, DR, and storage)
  - Link costs, power system impacts and value
4. Develop baseline budgets
5. Develop portfolio of spending options

# Schedule

| Task |                     | May  | Jun  | Jul | Aug | Sep   | Oct   | Nov | Dec   | Jan   |
|------|---------------------|--|--|-----|-----|---|---|-----|---|---|
| 1    | Analysis roadmap    |   |  |     |     |   |   |     |   |   |
| 2    | Performance metrics |  |  |     |     |   |   |     |   |   |
| 3    | DER sub-models      |  |  |     |     |   |   |     |   |   |
| 4    | Baseline budgets    |  |  |     |     |  |   |     |   |   |
| 5    | DER portfolio plan  |  |  |     |     |   |  |     |   |   |
| 6    | Reporting           |  |  |     |     |   |   |     |  |  |

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